

998245 (MISC)

NAVAL AIR SYSTEMS COMMAND  
 DEPARTMENT OF THE NAVY  
 WASHINGTON, D. C. 20360

DO-537-RD67-4

July 1966

DESIGN OBJECTIVE FOR A  
 CODE MATRIX BLOCK TESTER

PROBLEM

1. The Navy has a need for a testing device to determine whether code matrix blocks (CMB) being produced by reconnaissance sensors conform to established military standards. An instrument to accomplish this testing should be readily and easily usable in order to help isolate and correct malfunctions in code block producing cameras and devices to reduce problems in the subsequent reading of the code block by automated instruments. The only way to accomplish this now is to use a precise X-Y comparator to measure geometric accuracy and a micro-densitometer to check the densities. This device is intended for use in smaller field activities that do not have access to the above mentioned precision instruments.

OPERATIONAL CONCEPT

1. This design objective outlines the requirements to be met in the exploratory development of a small low cost instrument to verify the geometry and density of code matrix blocks. An instrument designed to test these blocks would be used whenever a particular CMB has proven unreadable, or for routine adjustment or calibration of CMB generating equipment. Any CMB on positive or negative film in roll or chip form, would then be positioned in conjunction with the tester and read statically, one at a time. As a part of this development, a preliminary investigation must be conducted to establish the minimum level of complexity required to accomplish the objective in a practical manner. The investigation will show clearly and concisely how this level of complexity was determined and to what extent the recommended device encompasses all the known problems involved in machine reading of the CMB. This device could conceivably be simple enough to consist of masks or grids to be used manually and read by eye. Any electrical, optical or mechanical components found to be required for the design of this device should remain basically simple but could involve screening of an enlarged image of the CMB using light available from a variety of light tables or from a light source internal to the device; manually positioned indicators to measure the parameters in stages or in representative portions; and a density comparison device or simple form of micro-densitometer. Another suggestion could be a very simple, small, precise X-Y comparator and micro-densitometer combination. These examples however, are not intended to direct or limit the design.

DETAILED REQUIREMENTS

1. The Military Standard for Reconnaissance and Mapping Data Marking, MIL-STD-782B (Wep), dated 20 March 1965, will supply the main guidelines in determining dimensions and tolerances to be measured by the CMB tester. The MIL-STD establishes the dimensions, positioning, quality of dot image and related film formats for the CMB which must

be tested by this device. The device must facilitate the reading of those measurements accurately and it must indicate in a positive manner and as simply as possible the exact nature and extent of the substandard conditions associated with any single CMB. The investigation or first phase of this development should be extensive enough to uncover any characteristics not included in the MIL-STD and which should be encompassed by the tester. Sources of information, other than the MIL-STD, which reflect the state of the art in CMB testing are expected to be used in developing this device. The initial development will be a breadboard model proving the principle. Eventual standardization and ruggedizing of a production model should be considered throughout the development in order to avoid over-complexity. Among other things, the response to this design objective will be judged on originality, ease of operation, effectiveness and simplicity of design.

2. This device shall be compact, self-contained, simple to operate and establish a high degree of confidence in its output.

The emphasis should be on an optical-mechanical approach rather than electronic to assure maximum reliability and simplicity. Any electronics required shall be solid state. Power requirements shall be 110V 60 cycle AC.

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<u>ITEM</u>	<u>NIKON #</u>	<u>NOMENCLATURE</u>	<u>UNIT PRICE</u>
1	71600	Nikon Model 6C Profile Projector	\$1295.00
2	71610	5X Projection Lens	230.00
3	71612	10X Projection Lens	90.00
4	71614	20X Projection Lens	90.00
5	71616	31.25X Projection Lens	120.00
6	71618	50X Projection Lens	120.00
7	71620	62.5X Projection Lens	120.00
8	71622	100X Projection Lens	120.00
9		Half reflecting mirrors w/holders for vertical surface illumination 10X	12.00
10		Half reflecting mirrors w/holders for vertical surface illumination 20X	12.00
11		Full reflecting mirrors w/holder for oblique surface illumination 10X	12.00
12		Full reflecting mirrors w/holder for oblique surface illumination 20X	12.00
13	71659	Lens Container 5X	1.00
14	71659	Lens Container 10X	1.00
15	71659	Lens Container 20X	1.00
16	71659	Lens Container 31.25X	1.00
17	71659	Lens Container 50X	1.00
18	71659	Lens Container 62.5X	1.00
19	71659	Lens Container 100X	1.00
20	71658	Condensor Lens for 10X	10.00
21	71657	Condensor Lens for 20X to 100X (combination)	10.00
22	71660	Built-in Brightness Booster f/50X to 100X	21.50
23	74024	2"X4" Cross Traveling Micro-stage reading directly in 0.001 mm	750.00
24	71740	Turret Assembly	120.00
25	71666	Protractor #6 - Ball Bearing	250.00
26	71760	Polarizing attachment for each of the following lenses-10X, 20X, 50X	35.00
27	74072	Goniometer 6 1/4" diameter graduated	172.00
28	74080	Polaroid #500 film holder used for 1 min. photo with 4"X5" photo attachment	49.95
29	71811	Photo Attachment 4"X5" w/self-contained focal plane shutter	385.00
			<u>\$4043.45</u>

Manufacturer: Nikon Inc., Instrument Division, Subsidiary of Ehrenrich Photo-optical Industries, Inc.

Vendor: Optical Apparatus Company, 128 Coulter Avenue, Phone MI 2-1636, Ardmore, Penn.

Note: This item and accessories can be purchased under GSA Contract #00S-57947

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